

Digestive System Chapter 14

Lecture Notes

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2000

p. 275 **Digestion** - Physical and chemical breaking down of food into smaller substances to be carried by the blood to body cells. Step-by-step process in which many organs work together. Three functions are 1. Digestion, 2. Absorption, 3. Elimination.

Gastrointestinal Tract is made up of two groups.

1. **Alimentary Canal** - mouth, pharynx, esophagus, stomach, small intestine, and large intestine. 30 feet long.
2. **Accessory Organs** - salivary glands, liver, gall bladder, and pancreas secrete **Enzymes** into the canal that chemically breaks down and digests food.

How is Food Digested

A. **Mechanically** - Chewed or **Mashing** (mouth) into small pieces gives you the greatest amount of energy and Churned (stomach).

B. **Chemically** - Secretions (glands) of Enzymes which speed up the break down.

Walking speeds up digestion by 40 - 50%.

Anatomy and Function

1. **Mouth** - 1ST step, chewing is called **mastication**, mixed with saliva, only part sensitivity.

2. **Salivary glands** - secrets saliva - 99% water, moistens, softens, lubricates, neutralizes acids and is ANS controlled.

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3. **Tongue** - tasting and speech, chewing and swallowing. Taste buds are called **Papillae** (sweet, sour, salty, bitter) pushes food back.

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4. **Esophagus** - muscular tube that moves food to the stomach, **Peristalsis**.

4a. **Cardiac Sphincter** - small muscle valve, separates the stomach from the esophagus, stops food and acid from backing up, not as strong as the pyloric.

5. **Stomach** - churns food about 3 - 4 hours into **Chyme** a highly acidic gastric juices, Hydrochloric Acid (HCL) destroys bacteria and starts on proteins, holds and controls rate of release.

5a. **Pyloric Sphincter** - small muscle valve, separates the stomach from the Duodenum, stops food from backing up all along the tract.

6. **Duodenum** - Chyme empties into, mixes with bile and pancreatic juice.

6a. **Small Intestine** - lined with villi projections which increases surface, most digestion (absorption) takes place here, bile, pancreatic juice and enzymes are secreted, complete digestion of food, about 20 feet long, takes 3-5 hours.

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7. **Large Intestine** - (Ascending Colon, Transverse Colon, Descending Colon, Sigmoid Colon) small intestine joins the colon at a junction called **Cecum**. **Appendix** is a small worm like projection of cecum. Undigested food called **Feces** slowly moves along as water is reabsorbed into the bloodstream. Harmless bacteria. Ends in the muscular **Rectum**, to **Anus** where feces is eliminated.

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8. **Liver** - all food absorbed into the bloodstream goes through the liver, largest gland (3 1/2 lbs.), storehouse for food, **Six Functions**

1. Produces **Bile**, secretes, emulsifies fat, changes fats and amino acids are split.

2. Converts sugar **Glucose** to **Glycogen**

3. Maintaining Glucose, regulates blood sugar

4. **Removes** dead Red Blood Cells (RBC) filter for excretion.

5. Changes Ammonia to **Urine**

6. **Stores** - Vitamin A, D, E, B12, Iron.

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9. **Gall Bladder** - stores and releases bile into the duodenum.

10. **Pancreas** - secretes pancreatic juice (**enzymes**) into the duodenum. Helps complete the breakdown for absorption.

A. Trypsin - proteins

B. Amylase - carbohydrates

C. Lipase - fats

D. Insulin - hormone

Problems and Care of Digestion

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Functional Problems

1. **Halitosis** - bad breath, poor oral hygiene, teeth, gums, food, nutrition, stomach.

2. **Indigestion** - stomach ache, heartburn, bloated, nausea, vomiting, or any pain or discomfort in the abdomen area. Causes can be from poor eating habits, too much, too little, too irregularly, too quickly, emotions, stress. Can cause cramps, nausea, and vomiting from improper breakdown.

3. **Heartburn** - acid content, backs up into esophagus, sphincter muscle closes tightly, irritated.

4. **Abdominal Hernia** - upper part of the stomach pushes through the diaphragm.

5. **Gas** - certain amount is normal, excess is uncomfortable, certain foods, eat too fast, bacteria feeds on, passing.

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6. **Nausea and Vomiting** - caused by motion, germs, medicines, drugs, distress, fullness, weakness, reflex response, protection, reverse peristalsis, strong muscle contractions in chest and abdomen.

7. **Diarrhea** - feces are watery, expelled frequently, foods moves too rapidly through large intestines, overactive colon, diet, food poisoning, emotional turmoil (stress), nutrition deficiencies, viral, bacterial, water not being reabsorbed, dehydration, drink liquids, water.

8. **Constipation** - feces becomes hard and dry, difficult movements, too much water absorbed from large intestine, lack fiber, erratic eating, not enough water, laxative use, need a balanced diet, water intake, exercise regularly.

9. **Gallstones** - small crystals from bile, block duct, medicine to dissolve, jaundice - yellow skin, surgery, shatter ultrasound.

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10. **Ulcers** - open sore, mucous membrane, peptic, tissue breakdown, dies, raw inflamed area, two types of peptic ulcers.

A. **Gastric ulcer** - open sore mucous membrane, stomach, overproduction Hydrochloric acid & pepsin - digestive enzyme.

B. **Duodenum ulcer** - in the duodenum and same as above. caused by stress, tobacco, heredity, aspirin abuse, pain upper part of stomach when stomach is empty, medicines neutralize, antibiotics, surgery.

11. **Gastritis** - inflammation of mucous membrane, food, alcohol, bacteria, viruses, cramps, pain, vomiting.

12. **Appendicitis** - inflammation of appendix, bacteria of matter gets lodged, swollen, fills with pus, bursts poisoning organs, pain, cramps, lower right, fever, vomiting, never use laxatives, surgery.

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13. **Hepatitis** - inflammation of liver, viral infection,

***Hepatitis A** - infectious, transmitted by human contact or contact with polluted water, slow recovery, rest & diet.

***Hepatitis B** - virus, bloodstream, transfusion, needles, jaundice, cirrhosis, drugs, surgery, dental, sexual contact.

14. **Tooth Decay** - weakens teeth, bite, chew, brush, floss, checkups.

15. **Crohn's Disease** - chronic, not known, influenced by heredity & environment, mucous lining inflamed, absorption severely affected, cramps, diarrhea, weight loss, avoid raw fruits and vegetables.

16. **Hemorrhoids** - swelling of veins in rectum & anus, internal stay inside, external push to the outside, sit a lot, strain, constipation, itching, pain (smarting), bleeding (fissure), hot baths, ointment (suppositories), surgery, exercises, fiber.

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16a. Diverticulosis - colon walls become pouched out to small sacs or divertical, become inflamed or infected, need fiber.

16b. Ulcerative Colitis - chronic bloody diarrhea, ulcers in colon.

16c. Stomach cancer - open scores in stomach wall, lining, or muscle, blood vessels are destroyed, stomach can be removed and Duodenum and small intestines take over.

16d. Colon cancer - small growths in large intestines, rectal bleeding, changes in bowel habits that persist and abdominal pain.

17. **Care of the Digestive System**

- | | |
|------------------|-----------------|
| a. variety | d. not too much |
| b. regular | e. water |
| c. relax & enjoy | |

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The Urinary System

Filters waste from the circulatory system and eliminates it.

Function - water-soluble waste products, carbon dioxide. nitrogen will become toxic. salts, water, nitrogenous wastes are filtered into small tubules (through cell membranes). **Excretory System**, when nutrients leave digestion and go to the liver, are stored or transported to cells for building, repairing, energy.

Structure - two kidneys, ureters, bladder, and urethra.

1. **Kidneys** (2) - bean shaped, size of fist, small of back, fatty tissue protects, outer layer is called **Cortex**, inter is the **Medulla**, and **Pelvis** called the core.

Within the medulla are one million highly specialized tubules called **nephrons** (tiny filters) that remove waste, tubule into a cluster of capillaries called **glomerulus**. The nephron that surrounds the glomerulus is called a **Bowman's capsule** or (cup).

Blood flows through the **renal artery** into smaller arterioles which is an extension and leaves **renal veins**. Because of **pressure** build up in the glomerulus, nephrons remove the substances (cleanse blood, balances H₂O and Salt), returns what the body needs and eliminates the rest as **urine** which is collected in the **bladder**.

Urine travels down the **ureters** to the bladder. Every drop of blood is filtered every hour. About 40 - 50 gallons are filtrated each day but about 1/2 gallon is urine.

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2. **Ureters** - tubes from the kidneys to bladder than to the **urethra**. passageway for urine.

3. **Bladder** - muscular organ that stores urine, holds up to a pint, the voluntary **Sphincter** muscle relaxes allowing you to pass urine out the urethra, babies don't have control, when full - reflex stimulus.

Problems of the Urinary System

1. **Incontinence** - inability to control bladder, Sphincter muscle is torn, weak, or damaged, older people.

2. **Cystitis** - bacterial infection, mostly females, painful burning sensation, frequent urination, fever, blood or pus in urine. Infection can move to the ureter and kidneys.

3. **Nephritis** - (acute) nephrons, cortex, or medulla become inflamed or infected, high blood pressure, fatigue, swelling of boggy tissues, chronic can destroy glomeruli or tubules.

4. **Urethritis** - inflammation of the urethra, painful burning sensation and difficult urination.

5. **Uremia** - blood is not relieved of waste and becomes poisonous. Need **Dialysis** - treatment to cleanse the blood.

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6. **Kidney Stones** - crystals from in pelvis from mineral salts and urea (calcium & nitrogen compounds), small stones may pass out in urine, large stones - great pain, blocks flow, infection, surgery maybe.

Lithotripsy - high-intensity sound waves, crumble stones then is passed out in urine, painless.

7. Pyelitis - infection in pelvis.

8. Prostatitis - inflammation of the prostate gland, blocks flow of urine.
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9. **Kidney Failure** - blockage of urine, serious nephritis or blood loss, can live with one but need a transplant (donated kidney) if both fail.

Treatments:

A. **Hemodialysis** - artificial kidney machine, (membranes) filters waste from blood and bath fluid cleans, 3 times a week for four hours each.

B. Peritoneal dialysis - uses peritoneum membrane from the digestive organs to filter blood with the use of a catheter, can be done at home.

C. Transplant - donated kidney is surgically planted.

*Most of your water intake comes from food and drink, you lose it through perspiration, exhale, urine, and feces.

*Diuretics - stimulates urine flow, caffeine, alcohol.

*Urinalysis - urine test, analysis of urine for defects.

Care of the System

1. Drink Plenty of fluids - 6 to 8 glasses a of water a day.

2. Nutritional balanced diet.

3. Good hygiene.

4. Regular physical checkups.
